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## GEOTRICHUM CANDIDUM AS A CAUSE OF CONJUNCTIVAL MYCOSES

Klinika Oczna (Eye Clinic)  
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Marian Perz

*Geotrichum candidum* is not very particular in choosing the ground where it grows, and it is not rare to find that it is present on the mucous membrane of man. Schnoor demonstrated that it was present in 29% and Swartz and Jankelson in 20.8% of regular stool. Reports in literature confirm its etiological participation in the diseases of skin (1,4), lungs and bronchi (6, 7, 12, 14) mucous membranes (2, 10) and cornea (9). Our own cases indicate that this particular fungus is also present in diseases of the conjunctiva.

### Our Own Cases

Case 1. - M. A., 66 years, admitted for operation of cataract. Right eye: conjunctiva and eyeball normal, except for obfuscation of the lens. V. o. d. counts fingers at 50 cm. Left eye same as right eye. V. o. s. detects light, projection good. T. o. maintained at 17 mm Hg.

Seeds from both conjunctival sacs showed an increase of Gram-positive spore-producing clubs and golden staphylococci. On the tenth day of hospitalization, the right conjunctiva produced white staphylococci and on both the fungus *Geotrichum candidum*, and the left conjunctiva produced white staphylococci. After additional four days the seed of Sabouraud nutritive substance showed a substantial growth of *Geotrichum candidum* and many bacteria. After two more days the inflammatory reaction of the conjunctiva suddenly intensified, particularly of both lower eyelids, and there appeared on the conjunctiva gray deposits of the size of grains of coffee which bled easily when we tried to remove them. The seeds from conjunctival deposits of both eyelids spread on Sabouraud's nutritious

substance showed a substantial increase of *Geotrichum candidum*. The conjunctival deposits disappeared after three days and the inflammatory reaction subsided. After three more days the seeds from the right conjunctiva showed white staphylococci and *Geotrichum candidum* on peptonic agar, and from the left conjunctiva there was no more any growth of microbes. Spreading of feces on Sabouraud's nutritious substance produced twice *Geotrichum candidum*.

After five months there was no growth of bacteria or fungi in the spreads of the substance obtained from the conjunctiva. The obfuscation of the left eye was removed. The course after the operation was without any complications.

Case 2. - W. A., 70 years, admitted for removal of cataract of the left eye. Seven years ago she was operated for a cataract of the right eye.

Right eye: eyeball and conjunctiva normal. No eyeglasses. V. o. d. from + 10.0 Dsph 5/5. Left eye: eyeball and conjunctiva regular, except for the obfuscation of the lens. V. o. s. movement of hand in front of the eye. T. o. maintained at 17 mm Hg.

Seeds obtained twice from the left conjunctival sac showed golden staphylococci. There was an inflammatory reaction of the conjunctiva which kept intensifying in spite of the treatment, and seeds obtained after two weeks showed golden staphylococci and *Geotrichum candidum* on a broth. Repeated spreading of seeds from the conjunctiva and feces on Sabouraud's nutritive substance revealed *Geotrichum candidum*. The patient was not operated.

Case 3. - L. J., 69 years, admitted for operation of a cataract. Three months earlier a purulent lachrymal sac was removed from the right eye.

Right eye: eyeball and conjunctiva normal, except for the obfuscation of the lens. V. o. d. counts fingers at 20 cm. Left eye same as right eye. V. o. s. counts fingers at 20 cm. T. o. maintained at 17 mm Hg.

Seeds spread twice from the right conjunctiva showed circular bacilli, white and golden staphylococci. There was a slight inflammatory reaction, and after three weeks the right conjunctiva produced white staphylococci and circular bacilli, while the left conjunctiva produced white staphylococci, greenish streptococci, and on peptonic agar the fungus *Geotrichum candidum*. The slight inflammatory reaction of the conjunctiva subsided shortly, and only white staphylococci grew on nutritive substances. A spread of feces on Sabouraud's nutritive substance showed an increase of the fungus *Geotrichum candidum*. The obfuscation of the right eye was operated. Postoperational course without complications.

Case 4. - S. W., 48 years, operated seven years ago for lithiasis of gall bladder and acute appendicitis. For one and half years she suffered from recurrent conjunctivitis of both eyes and from arthritis of the joints. Six months ago she began to show symptoms of lithiasis of the kidneys.

Right eye: congested conjunctiva, easily scarified, with blurred outline of Meibom glands. Eyeball normal. Left eye same as right eye. V. o. maintained at 5/5. T. o. maintained at 17 mm Hg.

Radiological thickening of mucous membrane of jaw sinuses. OB 24/53. The fungus *Geotrichum candidum* was grown from seeds obtained from urine, feces, and conjunctivae of both eyes.

#### Our Own Studies

Studies of the feces of 50 patients in the eye department showed the presence of *Geotrichum candidum* in 50% of the cases, *Candida albicans* in 34% of cases, and *Rhodotorula rubra* in 4% of cases, while in 10% of the cases there was a mixed presence of these microbes.

In order to determine the degree of the virulence of the fungus *Geotrichum candidum* inoculated in the eye by means of a Graefe knife which was previously immersed in the culture, I inoculated one eyeball of four white mice. They died after 37, 38, 55, and 98 days from the moment of infection. In the case of two mice, I observed before their death convulsions and paresis of the rear extremities. I did not obtain any fungi from the intestines. Histological studies showed the presence of groups of spores and individual filaments of the fungus in the conjunctivae of the infected eyes, and in the case of two mice there were also similar changes in the upper layers of the cornea (histological studies were carried out at the Institute of Pathological Anatomy of the J. Strus Hospital in Poznan, director C. Majowski, MD).

#### Discussion

The view which is generally accepted and according to which the disturbance of equilibrium of bacterial flora after a general and local administration of antibiotics is the cause of mycosis, has not been confirmed in the cases under discussion. The presence of numerous bacteria, which was observed in mycoses, was frequently the reason why these bacteria, particularly streptococci, were believed to play an etiological role in these processes, while the pathogenic significance of the fungi was disregarded. However, it seems that even a secondary appearance of fungi is not without significance and may intensify the inflammatory condition (3).

An injury during the operation could lead in the described cases of cataract to mycosis inside of the eyeball, when there is inflammation of the conjunctiva and *Geotrichum candidum* is present. When I performed operations of eye cataract, in a number of cases there were no complications of mycosis, in spite of the fact that the fungus was present in the

conjunctivae. This shows that it is not enough for the fungus to penetrate inside of the eyeball to produce mycosis. Other favorable conditions are needed for that. Nevertheless, this does not justify us to neglect pre-operational studies of the conjunctival sac with regard to the presence of fungi.

*Geotrichum candidum* develops in almost all nutritive substances used in bacteriological laboratories (8). Its growth on peptonic agar and broth was in the cases described above a basis for the diagnosis of conjunctival geotrichosis which by its clinical features - in the same way as geotrichosis of the cornea - does not differ from similar ailments caused by *Candida albicans*. The existence of fungi in lachrymal passages in the cases of conjunctival mycoses (3) can indicate that *Geotrichum candidum* participates in the formation of the inflammation of the lachrymal sac described above. This participation has not been determined in further details. I did not observe any pathological manifestations in the digestive tract, but this may be conditioned by the difference between the local changes which are often considerable and by the mild clinical symptoms (8).

The fact that the fungi appear in 78% of the cases under study in the mucous membranes of the digestive tract, of which *Geotrichum candidum* appears in 50% of the cases, indicates that the fungi play a greater role in various ailments than it is generally assumed. The last of the cases described above, particularly the study of its pathology, suggests that fungi play a role in certain diseases of unknown etiology, and it seems to provide an argument that these are manifestations of various mucoses and that one of these manifestations is conjunctival mycosis. The presence of *Geotrichum candidum* in urine shows an analogy with an infection by the yeast *Candida albicans*. The fact that the fungus *Geotrichum candidum* is present simultaneously in the mucous membranes (of the digestive tract and urinal tract) and in the conjunctivae in the cases described above indicates that these fungi are the center of the spread of the infection and that they may involve the phenomena of organotropism of these fungi.

In the opinion of some authors it is necessary to damage the eye to produce experimental mycosis of the eye through the blood stream. However, in the opinion of other authors it requires the formation of organotropism of the fungus as a result of the growing of the fungus on eye tissues. Conjunctival mycosis observed on both sides reminds us of inflammation of the sympathetic nerve (ophthalmia sympathica). This suggests that the mycotic inflammation of the other eye can reflect to some extent the organotropism of these fungi, and this organotropism undoubtedly exercises an influence on the formation of mycosis through the spread of the spores.

Experimental infection of white mice by the fungus *Geotrichum candidum* which resulted in death preceded by convulsions and paresis of the rear extremities, agrees with the results obtained by Hoffmann and Waubke in experiments involving *Candida albicans*. This indicates that mycotic inflammatory centers are formed through the spread of the spores. The period of time from the moment of the infection to the appearance of the

symptoms described above or the death of the mice varied. It seems that this time depends on how long it takes to absorb the fungus in the blood stream.

### Conclusions

1. The clinical picture of conjunctival geotrichosis can assume the form of the usual inflammatory reaction, sometimes including the appearance of gray deposits.

2. *Geotrichum candidum* is a fungus which is found most frequently in the mucous membranes of the digestive tract. Its simultaneous appearance in the mucous membranes of the urinal tract and of the conjunctivae may reflect organotropism.

3. The center of infection by the fungus may be a potential source of extensive infections and of the formation of mycosis through the spreading of the spores, and this does not necessarily require an injury.

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